

Appendix E1 – Restoration Plans and TMDLs (Watershed Assessments)

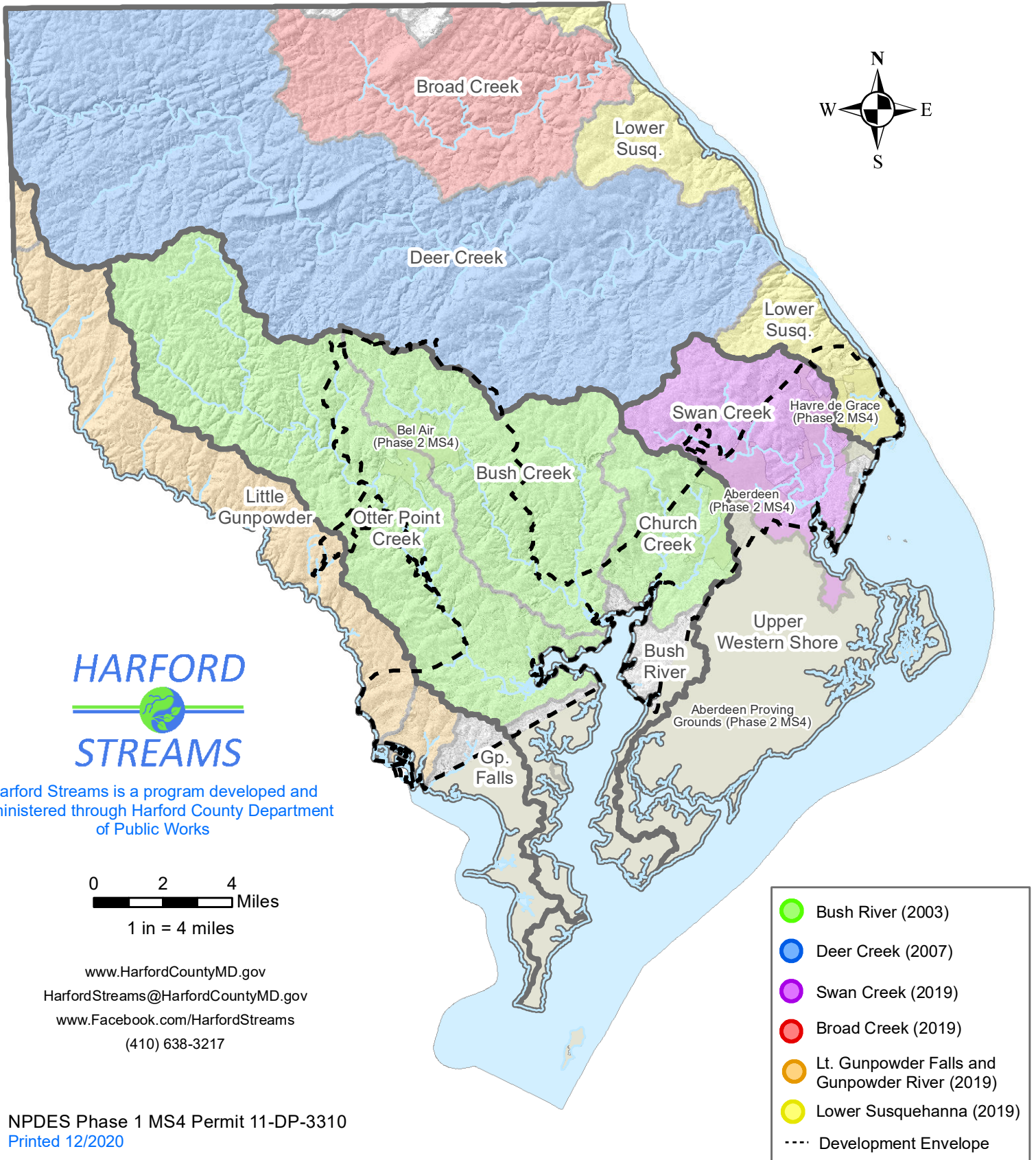
Appendix E1

Harford County, MD Department of Public Works Watershed Protection and Restoration

Large Watershed Assessments Completed through FY2020



Barry Glassman
County Executive



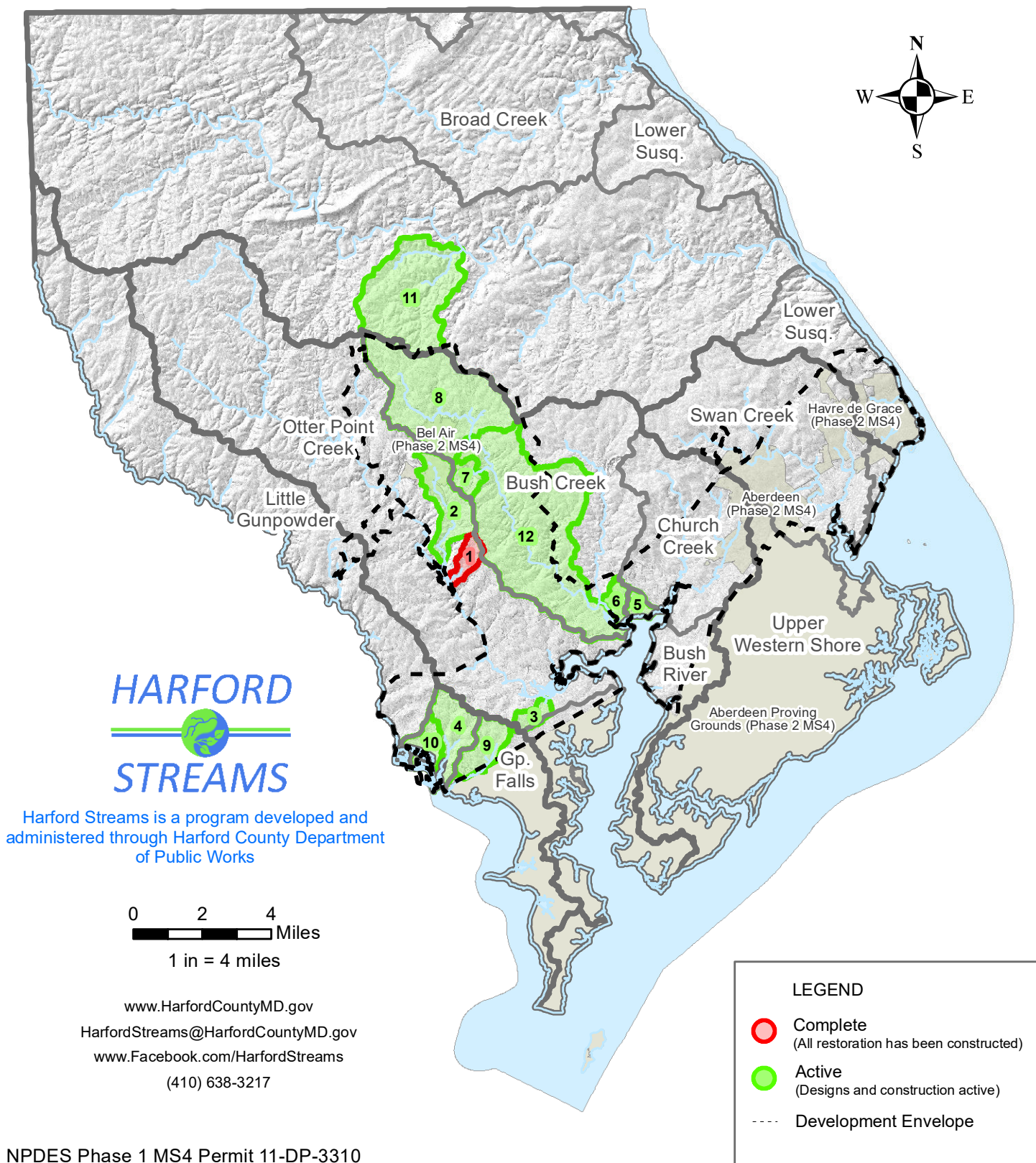
Appendix E1

Harford County, MD Department of Public Works Watershed Protection and Restoration

Small Watershed Assessments FY2020



Barry Glassman
County Executive



Harford County, MD Department of Public Works
Watershed Protection and Restoration
Small Watershed Assessments



Barry Glassman
County Executive

	Watershed	Completed	Drainage (ac)	Impervious (ac)	
1	Wheel Creek	2008	440	120	27%
2	Plumtree Run	2011	1,650	480	29%
3	Sams Branch	2012	370	90	24%
4	Foster Branch	2012	1,420	250	18%
5	Riverside Area	2014	300	110	37%
6	Declaration Run	2014	430	110	26%
7	Upper Farnandis Branch	2017	490	100	20%
8	Upper Bynum Run	2018	5,350	1,500	28%
9	Upper Emmord Branch	2018	1,010	190	19%
10	Taylors Creek	2018	670	200	30%
11	Stout Bottle Branch	2018	4,670	290	6%
12	Lower Bynum Run	2019	9,260	1,320	14%
Totals			26,060	4,760	18%



Green Choices ... Healthy Streams

Harford Streams is a program developed and administered through Harford County Department of Public Works



Watershed Assessment Technical Memorandum

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Division of Construction Management
Watershed Protection and Restoration Office
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Watershed Assessment Technical Memorandum

1 Introduction and Background

Harford County's (County) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Number 11-DP-3310, effective 30 December 2014 through 29 December 2019, requires the County to "complete detailed watershed assessment for the entire County." In this step of the watershed assessment, potential projects are identified for restoration credit. The County is interested in compiling all the potential project locations from the watershed assessment into one GIS feature class. This will:

- assist the County in identifying potential projects that are geospatially related to other improvements, and
- track the status of potential projects.

1.1 Purpose

The County contracted EA Engineering, Science, and Technology, Inc., PBC (EA) to compile the proposed projects in the identified watershed assessment plans provided in Table 1 into one GIS feature class, WatershedAssessment. The purpose of this feature class is to:

- track the completion and year of individual project;
- track the assigned County Best Management Practice (BMP) ID number;
- provide a comprehensive record of the potential projects within the County; and
- be exported for use as a Land BMP Input File into CAST Model (version CAST-2017d).

The purpose of this Technical Memorandum is to:

1. Identify the source data used to create the feature class.
2. Document the feature class schema.

2 Watershed Plans

The Watershed Plans were completed by several consultants for NPDES compliance. These plans were provided by the County to EA in PDF or Microsoft Word format. Some of the plans did contained corresponding GIS databases or SHP files. EA reviewed the data from each report and compiled the potential project locations into the WatershedAssessment feature class.

2.1 Small Watershed Action Plans

Table 1 is a list of the Small Watershed Action Plans that were used to compile the data into the WatershedAssessment feature class.



Table 1: Small Watershed Action Plan Summary

Waterway	Plan Name (Consultant, Year)
Bynum Run (Lower)	Lower Bynum Run Small Watershed Assessment Report (WSP 2019)
Bynum Run (Upper)	Upper Bynum Run Watershed Assessment Report (Stantec 2018)
Declaration Run and Riverside Watershed	Small Watershed Action Plan For Declaration Run and Riverside Watershed (URS 2014)
Emmord Branch (Upper)	North Reardon Inlet Watershed Small Watershed Action Plan (Bayland 2018)
Farnandis (Upper)	Upper Farnandis Small Watershed Assessment Report (WSP 2018)
Foster Branch	Foster Branch Small Watershed Action Plan (Bayland, 2013)
Plumtree Run	Plumtree Run Watershed Small Watershed Action Plan (Bayland, 2011)
Sam's Branch	Sam's Branch Tributary Watershed Assessment and Baseline Stream Monitoring (Biohabitats 2012)
Stout Bottle Branch	Stout Bottle Branch/Cabbage Run Subwatershed Action Plan (KCI 2012)
Taylor Creek	Taylor Creek Watershed Small Watershed Action Plan (Bayland 2018)
Wheel Creek	Wheel Creek Watershed Assessment (Bayland 2008)

2.2 Large Watershed Restoration Plans Assessment

Two large watershed restoration plans were written by URS in 2016 and updated by EA in 2019. Those plans were the *Harford County Chesapeake Bay Total Maximum Daily Load Restoration Plan for Nitrogen, Phosphorous, and Sediment* and the *Bynum Run Watershed Total Maximum Daily Load Restoration Plan for Sediment*. Both plans included GIS files with project locations already identified. The GIS files for both watershed restoration plans contained more BMP locations than what was reported in the final version of the plan. EA only kept the BMP locations that were included in the final watershed restoration plan.

3 WatershedAssessment Feature Class Schema

The WatershedAssessment feature class schema was created using ArcGIS Desktop. The schema and data descriptions are listed in Table 2.



Table 2: WatershedAssessment Feature Class Schema

Attribute	Description	Data Type
SourceBMPID	The original unique identifier from the Watershed Plan	Text – 15 characters
Source	A hyperlink to the Watershed Plan	Text – 250 characters
ProjectType	Identifies the Project Type	Domain: Structural BMPs Retrofits Stream Restorations Outfall Stabilization Tree Planting Non-Structural BMPs
BMPTYPE	Identifies the specific BMP and will match the BMP Domain Type of the MDE MS4 Geodatabase. For retrofit ProjectType, the BMPTYPE is the Proposed BMP Type of the retrofit (as compared to identifying the current BMP Type).	Domain: See Appendix A
TreatmentArea	The Treatment Area or Total Drainage Area draining to the BMP	Double
ImpArea	The Impervious Area within the Treatment Area	Double
RepVol	The volume of the BMP in units of acre-feet that was reported in the Watershed Plan	Double
CalcVol	The volume calculated based on an assumed PE of 1 inch	Double
ImpAreaTreat	The Impervious Area Treatment for the BMP that was reported in the Watershed Plan	Double
Area	The area of tree planting, permeable pavement installation, and/or impervious area removal in units of acres	Double
Length	The length of stream restoration projects and outfall restoration project with units of feet	Double
PropertyOwner	If available in the PDF report this will be populated as either private or public or a combination	Domain: Public Private Combination
NoProperties	Number of properties involved in the project area	Text
Status	Status of the BMP for consideration by the MS4 Office or Incomplete to represent not all data are present in the Watershed Plans	Domain: Planning Design Under Construction Completed Not Feasible Incomplete Information
YearAsBuilt	This will be to document the year of As-Built for the plan	Double
BMPID	This will be the County BMPID number to assist in tracking for MS4 Reporting and Triennial Inspections	Text – 15 characters



4 Data Population

EA populated the WatershedAssessment feature class with the information available in the watershed plans listed in Table 1. There are 967 WatershedAssessment points in the feature class. Table 3 lists the exceptions and rules that were applied when populating the WatershedAssessment feature class.

Table 3: Data Population Rules

Rule	Description
Multiple BMPs at the Same Location	A BMP may be present in multiple reports and resulted in two points on top of each other. The point with the most information was maintained and typically the source report references the smallest watershed.
PropertyOwner	Was populated based on information provided in the report. If the information was not present, then it was populated using Harford County's Cadastral Parcel Layer. The Cadastral Parcel Layer references the Maryland State Department of Assessments and Taxation (SDAT) website.
Stream Restoration Outfall Restoration Projects	The point is placed at the downstream-most point of the stream restoration project or outfall.
Tree Planting Area, Impervious Area Removal, Permeable Pavement Areas	The point is placed at the centroid of the polygon.
Volume Calculations	Proposed volumes with treatment areas and impervious area was calculated based on an assumed PE of 1 inch. Refer to Section 4.1 <i>Volume Calculations</i> for more information.

4.1 Volume Calculations

For proposed BMPs that were missing volume calculation in the watershed assessment report, EA calculated the volume based on the treatment area, impervious and an assumed PE of 1 inch and populated the CalcVol attribute using the following equation:

$$ESD_v = \frac{P_E R_v A}{12}$$

$$R_v = 0.05 + 0.009I$$

$$ESD_v = \frac{1 \times \left(0.05 + 0.009 \left(\frac{imparea}{TreatArea} \right) \right) \times TreatArea}{12}$$

This calculation was done using a Python script.



5 Data Checks

Table 4 lists the data checks that EA performed on the data included in the feature class.

Table 4: Data Checks

Check	Description
Duplicate Points	A BMP may be present in multiple reports and therefore result in multiple points on top of each other. The point with the most information was maintained and typically the source report references the smallest watershed.
Domain Check	Based on Appendix A confirmed the BMPType matched the ProjectType.
Area	Confirmed only Tree Planting, Permeable Pavement and/or Impervious Area removal BMP Types had area values.
Length	Confirmed only Stream Restoration and Outfall Restoration Projects had length values.
Invalid Geometry	Confirmed all points had geometric points. If points did not have geometric points they were updated.

6 Watershed Assessment Standard Operating Procedures

The County will continue to subcontract services for Watershed Assessment Plans. EA recommends the following geodatabase standards, identified in Table 5 to be applied to deliverables for future Watershed Assessment Plans.

Table 5: Geodatabase Deliverable Standards

Item	Description		
Projection	NAD_1983_StatePlane_Maryland_FIPS_1900 (US Feet)		
Geodatabase	File Geodatabase		
Feature Class	Point Feature		
Schema	Consultants performing the Watershed Restoration plans will have to populate information in their schema.		
	Attribute	Description	Data Type
	SourceBMPID	The original unique identifier from the Watershed Plan	Text – 15 characters
	ProjectType	Identifies the Project Type	Domain: Structural BMPs Retrofits Stream Restorations Outfall Stabilization Tree Planting Non Structural BMPs
	BMPType	Identifies the specific BMP and will match the BMP	Domain: See Appendix A



Item	Description		
		Domain Type of the MDE MS4 Geodatabase. For retrofit ProjectType, the BMPType is the Proposed BMP Type of the retrofit (as compared to identifying the current BMP Type).	
	TreatmentArea	The Treatment Area or Total Drainage Area draining to the BMP	Double
	ImpArea	The Impervious Area within the Treatment Area	Double
	RepVol	The volume of the BMP in unit of acre-feet that is reported in the Watershed Plan	Double
	ImpAreaTreat	The Impervious Area Treatment for the BMP that was reported in the Watershed Plan	
	Area	The area of tree planting, permeable pavement installation and/or impervious area removal in units of acres	Double
	Length	The length of stream restoration projects and outfall restoration project with units of feet	Double
	PropertyOwner	The owner category of the property where the project is located. (Public, Private, Combination)	Domain: Public Private Combination
Data Checks	Perform Data Checks listed in Table 4, Section 4 <i>Data Checks</i> .		
Metadata	A description/summary should include the firm's name, contract number, and date of submittal along with an overall description of the data. Any extra attributes added to the schema should be explained in the metadata.		



Appendix A – BMP Type Domain



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BMPTYPE Domain

Code	Code Description	Project Type	Notes
AGRE	Green Roof - Extensive	Structural	
AGRI	Green Roof - Intensive	Structural	
APRP	Permeable Pavements	Structural	
ARTF	Reinforced Turf	Structural	
BRCT	Bio-Reactor Carbon Filter	Structural	
DID	Disconnection of Illicit Discharges		
EDU	Education		
FBIO	Bioretention	Structural	
FORG	Organic Filter (Peat Filter)	Structural	
FPER	Perimeter (Sand) Filter	Structural	
FPRES	Floodplain Restoration		
FSND	Sand Filter	Structural	
FUND	Underground Filter	Structural	
IBAS	Infiltration Basin	Structural	
ITRN	Infiltration Trench	Structural	
MENF	Enhanced Filters	Structural	
MIBR	Infiltration Berms	Structural	
MIDW	Dry Well	Structural	
MILS	Landscape infiltration	Structural	
MMBR	Micro-Bioretention	Structural	
MRNG	Rain Gardens	Structural	
MRWH	Rainwater Harvesting	Structural	
MSGW	Submerged Gravel Wetlands	Structural	
MSWB	Bio-Swale	Structural	
MSWG	Grass Swale	Structural	
MSWW	Wet Swale	Structural	



Code	Code Description	Project Type	Notes
NDNR	Disconnection of Non-Rooftop Runoff	Non-Structural	Example – curb cuts in parking lots direct the stormwater water runoff to open area
NDRR	Disconnection of Rooftop Runoff	Non-Structural	
NSCA	Sheetflow to Conservation Areas	Non-Structural	
ODSW	Dry Swale	Structural	
PET	Pet Waste Management	Structural	
PMED	Micropool Extended Detention Pond	Structural	
PMPS	Multiple Pond System	Structural	
PPKT	Pocket Pond	Structural	
PWED	Extended Detention Structure, Wet	Structural	
PWET	Retention Pond (Wet Pond)	Structural	
RBS	River Bank Stabilization	Structural	
SPSC	Step Pool Storm Conveyance	Outfall Stabilization	Can also be Regenerative SW Conveyance
SUB	Sub-Soiling	Structural	
TRA	Trash Removal		
WEDW	Extended Detention - Wetland	Structural	
WPKT	Pocket Wetland	Structural	
WPWS	Wet Pond - Wetland	Structural	
WSHW	Shallow Marsh	Structural	
XDED	Extended Detention Structure, Dry	Structural	
XDPD	Detention Structure (Dry Pond)	Structural	
XFLD	Flood Management Area		
XOGS	Oil Grit separator	Structural	
OTH	Other		
IMPR	Reduction of Impervious surface	Structural	



Code	Code Description	Project Type	Notes
TREE	Tree Planting Locations	Tree Planting	Only Area
BUFF	Riparian Buffer Planting Areas	Tree Planting	Only Area
STRE	Stream Restoration	Stream Restoration	includes Head Cut Stabilization, Bar Stabilization, Slope stabilization, Bank Erosion Value of Length in FT
INLE	Proprietary inlet devices (Tree Box Filter, Vortex, etc..)	Structural	
FILT	Filter Strips		
OUTF	Outfall Stabilization	Structural	Use for when Step Pool Storm Conveyance is not specifically called out.
WSND	Sand Seepage Wetland	Structural	Specifically, in Sams Branch
FORE	Forebay and Pretreatment	Structural	



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Proposed Restoration Projects (Impervious Acres Treated)

	ST Practices	RR Practices	Stream Restoration	Tree Plantings	Total
Bush River	488.8	98.5	1517.2	159.2	2263.8
Gunpowder River	157.6	3.9	752.9	2.8	917.2
Lower Susquehanna River	48.2	37.6	8.0	0.0	93.8
Upper Western Shore	8.4	7.2	0.0	0.0	15.6
Total	703.1	147.2	2278.1	162.0	3290.4

Bush River Watershed (Proposed)

RR - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Bioretention	110	41.6				
Bioswale	13	49.6				
Micro Bioretention	18	2.9				
Permeable Pavement	8	0.2				
Submerged Gravel Wetlands	14	4.3				
Total	163	98.5				

ST - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Infiltration Basin	19	9.0				
Outfall Stabilization	30	18.1				
Sand Filter	47	11.7				
Step Pool Storm Conveyance	84	39.2				
Wet Pond	147	410.9				
Total	327	488.8				

Stream Restoration

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Stream Restoration	57	1,517				

Tree Planting

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Tree Planting	80	159				

Total 627 2,263.8

Gunpowder River Watershed (Proposed)

RR - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Bioretention	28	3.5				
Bioswale	0	0.0				
Micro Bioretention	5	0.0				
Permeable Pavement	0	0.0				
Submerged Gravel Wetlands	1	0.4				
Total	34	3.9				

ST - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Infiltration Basin	3	0.6				
Outfall Stabilization	0	0.0				
Sand Filter	5	0.9				
Step Pool Storm Conveyance	1	44.9				
Wet Pond	19	111.2				
Total	28	157.6				

Stream Restoration

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Stream Restoration	51	753				

Tree Planting

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Tree Planting	5	3				

Total 118 917.2

Lower Susquehanna River Watershed (Proposed)

RR - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Bioretention	47	37.6				
Bioswale	0	0.0				
Micro Bioretention	0	0.0				
Permeable Pavement	0	0.0				
Submerged Gravel Wetlands	0	0.0				
Total	47	37.6				

ST - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Infiltration Basin	2	0.2				
Outfall Stabilization	0	0.0				
Sand Filter	25	5.9				
Step Pool Storm Conveyance	0	0.0				
Wet Pond	31	42.2				
Total	58	48.2				

Stream Restoration

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Stream Restoration	2	8				

Tree Planting

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Tree Planting	0	0				

Total 107 93.8

Upper Western Shore Watershed (Proposed)

RR - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Bioretention	12	7.2				
Bioswale	0	0.0				
Micro Bioretention	0	0.0				
Permeable Pavement	0	0.0				
Submerged Gravel Wetlands	0	0.0				
Total	12	7.2				

ST - Stormwater Performance

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Infiltration Basin	0	0.0				
Outfall Stabilization	0	0.0				
Sand Filter	4	2.1				
Step Pool Storm Conveyance	0	0.0				
Wet Pond	3	6.3				
Total	7	8.4				

Stream Restoration

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Stream Restoration	0	0				

Tree Planting

	# Projects	IA Treated	N Reduction	P Reduction	S Reduction	Cost
Tree Planting	0	0				

Total 19 15.6

Summary of Restoration Projects by Watershed Assessment

Harford County, MD Department of Public Works
Watershed Protection and Restoration
Wheel Creek Stream Improvement Projects



Wheel Creek Watershed Assessment (2008)
(440 acres / 120 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000030	Wheel Creek at Calvert Walks Stream Restoration	2013	1	21.75	\$324,682	\$204,951	\$14,928	
WP000022	Wheel Creek at Gardens of Bel Air SWM Retrofit	2013	1	4.79	\$322,120	\$178,804	\$67,248	
WP000026	Wheel Creek at Festival at Bel Air SWM Retrofit	2016	1	12.00	\$385,601	\$195,436	\$32,133	
WP000024	Wheel Creek at Country Walk 1A SWM Retrofit	2016	2	8.66	\$576,532	\$324,119	\$66,574	
WP000025	Wheel Creek at Country Walk 1B SWM Retrofit	2017	1	3.66	\$292,152	\$118,614	\$79,823	
WP000027	Lower Wheel Creek SWM Retrofit & Stream Restoration	2017	6	139.52	\$2,103,964	\$1,420,177	\$15,080	
				Totals	190.38	\$4,005,051	\$2,442,103	\$21,037



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Plumtree Run Stream Improvement Projects



Plumtree Run Watershed Assessment (2011)
(1650 acres / 480 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000040	Pumphrey Property Demolition	2009	3	0.51				
WP000013	Plumtree Run at Tollgate Stream Restoration	2011	1	50.40	\$428,877	\$215,000	\$8,509	
WP000035	Ring Factory ES SWM Retrofit & Stream Restoration	2018	3	41.33	\$1,490,585	\$660,132	\$36,065	
WP000088	Stormwater Retrofit at Homestead Elementary	2019	1	1.57	\$131,374	\$0	\$83,678	
WP000087	Tributary to Plumtree Run at Wakefield Manor Stream Restor	2019	1	8.58	\$97,159	\$0	\$11,324	
WP000039	Plumtree Run at Barrington Stream Restoration	2020	7	85.06	\$3,282,552	\$0	\$38,591	
				Totals	187.45	\$5,430,548	\$875,132	\$28,971



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Sams Branch Stream Improvement Projects



Sams Branch Watershed Assessment (2012)
(370 acres / 90 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000042	Washington Court Demolition	2011	1	2.11				
WP000033	Willoughby Beach SWM Retrofit & Stream Restoration	2020	6	51.72	\$1,794,077	\$1,100,000	\$34,688	
				Totals	53.83	\$1,794,077	\$1,100,000	\$33,329



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Foster Branch Stream Improvement Projects



Foster Branch Watershed Assessment (2012)
(1420 acres / 250 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000037	Foster Branch at Stillmeadow Stream Restoration	Active	3	31.44	\$902,070	\$0	\$28,692	
WP000019	Woodbridge SWM Retrofit	2013	1	3.80	\$256,467	\$0	\$67,491	
WP000032	Foster Branch at Trimble Road Stream Restoration	2014	1	24.26	\$570,051	\$275,000	\$23,498	
WP000020	Woodbridge Stream Restoration	2015	1	24.60	\$553,083	\$258,832	\$22,483	
WP000036	Foster Branch at Dembytown Stream Restoration	2017	2	42.10	\$902,662	\$500,000	\$21,441	
				Totals	126.20	\$3,184,333	\$1,033,832	\$25,232



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Declaration Run Stream Improvement Projects



Declaration Run Watershed Assessment (2014)
(430 acres / 110 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000043	Northwest Branch Declaration Run Stream Restoration	Active	1	38.80	\$4,071,252	\$0	\$104,929	
WP000034	Church Creek ES SWM Retrofit & Stream Restoration	Active	3	45.92	\$1,911,160	\$980,000	\$41,619	
				Totals	84.72	\$5,982,413	\$980,000	\$70,614



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Upper Farnandis Branch Stream Improvement Projects



Upper Farnandis Branch Watershed Assessment (2017)
(490 acres / 100 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre
WP000097	Woodland Run Stream Restoration	Active	1	54.00	\$1,204,996	\$0	\$22,315
Totals				54.00	\$1,204,996	\$0	\$22,315



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Upper Bynum Run Stream Improvement Projects



Upper Bynum Run Watershed Assessment (2018)
(5350 acres / 1500 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre
WP000110	Spenceola Retrofit	Active	1	2.50	\$457,449	\$0	\$182,980
WP000109	Hickory Vet Retrofit	Active	1	0.80	\$315,565	\$0	\$394,457
WP000108	Gavigans Retrofit	Active	1	1.00	\$323,790	\$0	\$323,790
WP000091	C Milton Wright Stormwater Retrofit and Stream Restoration	Active	1	35.00	\$2,686,267	\$0	\$76,750
WP000012	Bynum Ridge Stream Stablization	2011	1	13.95	\$225,212	\$0	\$16,144
WP000018	Friends Pond SWM Retrofit	2011	1	11.70	\$109,761	\$0	\$9,381
WP000104	Courthouse Bioretention	2020	1	0.48	\$165,415	\$0	\$344,615

Harford County, MD Department of Public Works
Watershed Protection and Restoration
Upper Bynum Run Stream Improvement Projects



Upper Bynum Run Watershed Assessment (2011)
(1650 acres / 480 acres impervious)

Project	Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre
Totals			65.43	\$4,283,459	\$0	\$65,466



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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Upper Emmord Branch Stream Improvement Projects



Upper Emmord Branch Watershed Assessment (2018)
(1010 acres / 190 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000056	Magnolia Middle School Tree Planting	2014	1	0.23	\$5,295	\$5,295	\$23,022	
WP000094	Magnolia Middle School Tree Planting II	2015	2	0.47	\$12,267	\$12,267	\$26,101	
WP000085	Emmord Stream Restoration	2020	1	19.50	\$754,621	\$0	\$38,698	
				Totals	20.20	\$772,183	\$17,562	\$38,227



Green Choices ... Healthy Streams

Harford Streams is a program developed and administered through Harford County Department of Public Works

Harford County, MD Department of Public Works
Watershed Protection and Restoration
Taylors Creek Stream Improvement Projects



Taylors Creek Watershed Assessment (2018)
(670 acres / 200 acres impervious)

Project		Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre	
WP000105	Mariner Point Tree Planting	2020	1	0.28	\$79,044	\$0	\$282,301	
				Totals	0.28	\$79,044	\$0	\$282,301



Green Choices ... Healthy Streams

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Harford County, MD Department of Public Works
Watershed Protection and Restoration
Lower Bynum Run Stream Improvement Projects



Lower Bynum Run Watershed Assessment (2017)
(490 acres / 100 acres impervious)

Project	Year Complete	Number of BMPs	Impervious Credits (ac)	Total Cost	Grants	Cost per Acre
WP000021 Sunnyview Drive Stream Restoration	Active	1	90.00	\$2,309,789	\$0	\$25,664
WP000057 Patterson Mill High School Tree Planting	2013	1	0.80	\$23,688	\$23,688	\$29,610
WP000029 Bynum at St Andrews Way Stream Restoration	2019	1	92.52	\$2,120,749	\$1,600,000	\$22,922
Totals			183.32	\$4,454,226	\$1,623,688	\$24,298



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